GEORGE TECH AEROSPACE ENGINEERING SENIOR BANQUET
Remarks for Administrator Bolden
April 1, 2015

Thank you **Professor Clarke** [Jean-Paul]**. As the proud father of a Georgia Tech Chemical Engineering graduate,** I always love coming back to the Tech Campus.

Along with our entire NASA family, I am greatly indebted to Georgia Tech for lending us Dr. **Bobby Braun**, who was my first NASA Chief Technologist. Georgia Tech loaned me Bobby for two years, during which time he stood up the Office of Chief Technologist and our current Space Technology Program.

- He's now back at Tech, but still doing great work for us – he's out at NASA's Jet Propulsion Lab this semester, helping us with critical tech work that will enable our Journey to Mars.

I've had a terrific day spending time with your fellow students and members of the faculty – there's a real energy here on campus.

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I began my day this morning in Washington, meeting with the Federal Aviation Administration's Commercial Space Transportation Advisory Committee (COMSTAC). It occurred to me on the way here – you might say I had *"Georgia on my Mind"* – that we might have a few future members of this Committee with us in the audience at Georgia Tech tonight.

Looking out among you, I see future entrepreneurs, inventors, and astronauts. I see future CEOs, engineers, and perhaps – *this would give me endless delight* – a future Administrator of NASA.

WE NEED YOU

One of my great pleasures as Administrator is the opportunity to meet with young folks like many of you. You know, when I was in school, it never occurred to me that I could someday be a pilot, and especially not an astronaut.

I grew up in Columbia, South Carolina in the ‘50s and ‘60s and those things were not even on my radar. I definitively didn’t think I’d someday be here speaking to you as the head of NASA.

So, as much as possible, I like to encourage students to look to the skies and beyond when they think about their future career.

One of the key pieces advice I give them is to do exactly what you’re all doing: **to pursue studies in science, technology, engineering, and math – what are sometimes referred to as the “STEM” disciplines**, so, you’re already ahead of the game.

When the Wright Brothers were asked how their Flyer worked, they used to say that it *“stays up because it doesn’t have time to fall.”* When it comes to educating the next generation of STEM professionals, time is also of the essence. **As a country, we don’t have time to *fall,* and we don’t have time to *fail.***

We know that our global competitors are investing to educate their own students in these disciplines and we know that in our country, there's a significant "skills gap" between the number of jobs that require STEM skills and the number of folks in our workforce who have the necessary training.

So what this means is that **we need you – badly.** Your country needs you. More specifically, NASA needs people like you. We're in the midst of a remarkable new era of spaceflight and scientific discovery – and we're counting on your generation to pilot it forward.

Last week, I had the chance to participate with President Obama in the White House Science Fair and I want to share with you a few of the words he shared with the students there. He said that, and I quote:

"… [T]here's always something more to learn, and to try, and to discover, and to imagine … it's never too early, or too late to create or discover something new. That's why we love science.

It's more than a school subject, or the periodic table, or the properties of waves. It is an approach to the world, a critical way to understand and explore and engage with the world, and then have the capacity to change that world…"

You know, when you talk to people in my generation, we can't even begin to imagine what's going through your minds. You think about things today that are inconceivable to us. I tell people that I'm blessed to have three beautiful granddaughters – an eight-year-old, a 12-year-old, and a 15-year old. When I talk to them about NASA's efforts to send humans to Mars, without fail they say – *"you're not stopping there, are you?"* You see - they take it for granted that their generation is going to travel to Mars.

You and your fellow Yellow Jackets are part of what I like to call "the space generation."

I say that not only because of the places you'll go, but also because of the expansive way you look at our world, our universe and the possibilities they contain. You routinely talk with colleagues half a world away, whether it's via Skype or social media – in fact some of you may be tweeting right now.

In your lifetime, you can contemplate locating a world like Earth that's orbiting a star in another solar system. You can believe that the manmade challenges facing us on a global scale can be overcome with even greater efforts at cooperation across international lines.

You live in a world where astronauts from many nations fly together in space every single day – in fact, **this past weekend I attended the launch of American astronaut Scott Kelly and his Russian cosmonaut counterpart, Mikhail Kornienko, into space** from Baikonur, Kazakhstan – and as we speak, they're working together on the International Space Station (ISS), the place they'll call home for the next year.

It’s the first time an American astronaut will live and work in space for an entire year, and it’s an important stepping-stone on our journey to Mars.

I like to tell people that what NASA does is important for inspiring the next generation, but really, I think you already have that spark – that’s why you’re studying aerospace engineering at a great institution like Georgia Tech.

MARS

I want to share with you a little bit about our journey into the future … and it begins, with **NASA’s Journey to Mars.**

I want to invite you to close your eyes for a moment and imagine a future where human beings and robots work together to pioneer Mars and the Solar System … we’re in the midst of turning what once was considered science fiction into fact.

If you are among those of us who saw the State of the Union address back in January, you might recall that that President Obama talked about *"…pushing out into the solar system not just to visit…but to stay."*

The President has set us on course for a journey to Mars. His vision is for **the United States to extend humanity's reach into space while strengthening America's leadership here on earth.**

Our goals are to visit an asteroid by 2025 and to put humans in the Martian environment in the 2030's. We'll begin with an unprecedented mission to redirect an asteroid into orbit around the moon. We'll then send astronauts to visit it as part of a stepping stone approach to reach the Red Planet. We just announced details about the robotic capture portion of that initiative last week.

Over the past six years, we've taken the most concrete steps ever to advance a human mission to Mars. Astronauts on the ISS, for instance, have been performing groundbreaking experiments to help us learn more about human health in space.

Our latest Mars spacecraft, *MAVEN*, arrived last September to study the Red Planet's upper atmosphere and joined a fleet of orbiters and rovers on the surface. ***Maven* is building on America's 40-year legacy of advanced robotic exploration of that planet.**

America is still the only nation to successfully land a spacecraft on Mars and this is a legacy we intend to continue.

Next year, we will send the *InSight* lander to study the planet's core and in 2020, a new rover, building on the incredible success of *Curiosity*, will help us prepare for human arrival at Mars and, for the first time ever, it will cache a sample for later return to Earth.

To fuel our vision, recently, we fired up the largest, most powerful booster ever built, in a ground test for the Space Launch System – or SLS - at the Orbital-ATK test facilities in Utah. This is significant, because someday this rocket will carry astronauts to deep space aboard the *Orion* spacecraft.

In short, we're firmly on a Journey to Mars and I believe this journey will help define your generation.

INTERNATIONAL SPACE STATION

Now, a moment ago I mentioned the International Space Station. If you look at the ways in which astronauts and scientists from countries across the planet are working together in harmony and common cause, I believe that **the ISS is truly a blueprint both for international cooperation and for scientific advancement.** Together with partners from around the world, we're working off the Earth, for the benefit of the Earth.

Just a few weeks ago, astronauts aboard the Space Station undertook three successful spacewalks. They were helping configure the Station to accept commercial vehicles that are currently being developed by SpaceX and Boeing – in just a couple years, these vehicles will transport American astronauts to the Space Station from American soil.

We've already returned cargo resupply missions to the United States and the result is that we're insourcing jobs and creating a whole new private market in low earth orbit.

This work is an incredible testament to American ingenuity and know-how – and it's a legacy that I hope you will be a part of continuing and building upon.

SPANNING THE UNIVERSE

You've heard me talk a lot about Mars tonight and before I close I also want to tell you briefly about a few other destinations – because our exploration spans the universe. **Everywhere imaginable, NASA is out there – including now, outside the solar system**.

When the *New Horizons* spacecraft arrives in the Pluto system in July, the United States of America will have – for the first time in human history – flown by or visited every single planet and dwarf planet in the solar system.

Just to give you a few quick examples:

- The *Dawn* spacecraft has just begun to orbit Ceres, the largest asteroid in the main asteroid belt. Ceres is now considered a dwarf planet;

- *Juno* is speeding toward arrival at Jupiter next year; and

- The Kepler mission continues to discover new planets outside our solar system. It has confirmed more than 1000 planets, some of which could be rocky like Earth. The Solar Dynamics Observatory just took its 100 MILLIONTH image of the sun.

Meanwhile, the Hubble Space Telescope marks 25 years in space next month, and is still doing amazing science. In just three years, we'll launch *Hubble's* successor, the James Webb Space Telescope.

In dozens of other missions, the data streaming back to us is bathing us in information through which scientists will sort, decipher and make discoveries for years to come.

AERONAUTICS

Last but certainly not least, I know that we have some students here who have a particular interest in that first "A" in NASA – aeronautics.

I like to say **"NASA is With You When You Fly." Every American aircraft and every American air traffic control tower is equipped with technology that was developed by NASA.**

Our technologies are saving lives, saving money, and perhaps even saving our planet.

Let me give you an example. Show of hands: how many of you have ever made a paper airplane? So let me ask our paper airplane experts – have you ever bent the tips on the wings? It makes it better, doesn't it?

Well, just like on a paper airplane, NASA's Richard Whitcomb developed winglet technology for actual planes. Roughly two decades

after its development, winglet technology is credited with saving upwards of 4.7 billion – that's billion with a "b" – gallons of jet fuel (according to projections from Aviation Partners and Boeing). At $1.57 a gallon, that's a savings of more than $7 billion. At $2.84 a gallon, where we were last summer, it's a savings of $13.4 billion and for our planet, it means that less carbon dioxide is being emitted into our atmosphere.

Maybe sometime, one of you will develop the next great technology that saves resources and benefits our environment.

For our part at NASA, we're working to transform aviation for the better by reducing the environmental impact of flight; continuing to pave the way for revolutionary new aircraft shapes and propulsion; and keeping our skies safe for air travel. We don't want our skies to start getting dangerous as they get more crowded.

CONCLUSION

Again, it's great to be here with all of you.

Our journey of discovery as a country is really just only beginning. We're in the midst of a renaissance in many fields and an expansion of many that are still in their infancy – including the discovery of planets outside our solar system … and we're counting on you to be a part of it.

You're going to help us figure out how to shield astronauts from radiation on the way to Mars. You're going to help us figure out how to get all that mass to the surface of Mars so humans can set up an outpost there. You're going to take the data from all of our Earth science missions and help us tackle climate change.

Eleanor Roosevelt famously said, "*The future belongs to those who believe in the beauty of their dreams."*

My advice to you is to keep faith with the beauty of your dreams …

Keep working hard. Keep studying hard. And most importantly, don't be afraid of failure!

Thank you all very much.